US009282537B2

(12) **United States Patent**
Gerrish et al.

(10) **Patent No.: US 9,282,537 B2**
(45) **Date of Patent: Mar. 8, 2016**

(54) **MASS NOTIFICATION SYSTEMS**

(71) Applicants: **Kevin Gerrish**, Largo, FL (US); **Ted Milburn**, Bradenton, FL (US); **Elliott Onstine**, Bradenton, FL (US); **Mark Bishop**, Tampa, FL (US)

(72) Inventors: **Kevin Gerrish**, Largo, FL (US); **Ted Milburn**, Bradenton, FL (US); **Elliott Onstine**, Bradenton, FL (US); **Mark Bishop**, Tampa, FL (US)

(73) Assignee: **Cooper Technologies Company**, Houston, TX (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 49 days.

(21) Appl. No.: **14/219,731**

(22) Filed: **Mar. 19, 2014**

(65) **Prior Publication Data**

US 2015/0271781 A1 Sep. 24, 2015

(51) **Int. Cl.**

H04W 68/02	(2009.01)
H04W 4/22	(2009.01)
H04L 12/18	(2006.01)

(52) **U.S. Cl.**

CPC ***H04W 68/02*** (2013.01); ***H04L 12/1895*** (2013.01); ***H04W 4/22*** (2013.01)

(58) **Field of Classification Search**

None

See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

6,518,878	B1	2/2003	Skoff	
8,350,694	B1	1/2013	Trundle et al.	
2001/0043231	A1*	11/2001	Abbott et al.	345/700
2009/0201143	A1	8/2009	McKenna et al.	
2012/0072844	A1*	3/2012	Lefrancois des Courtis et al.	715/736
2012/0286924	A1	11/2012	Goto	
2013/0091213	A1*	4/2013	Diab et al.	709/204

OTHER PUBLICATIONS

International Search Report for PCT/US2015/020585, mailed Jun. 1, 2015.

* cited by examiner

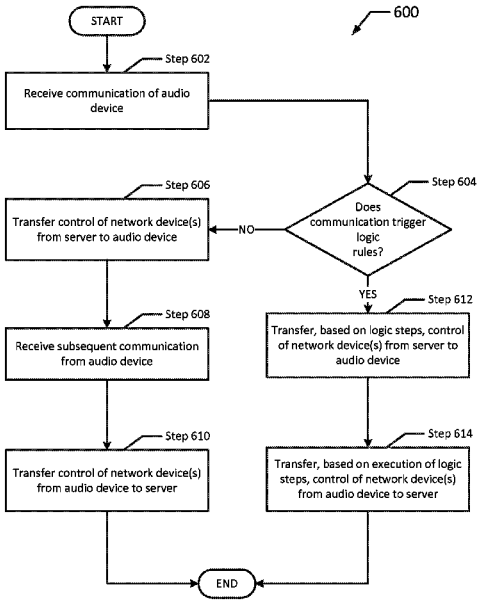
Primary Examiner — Diane Mizrahi

(74) *Attorney, Agent, or Firm* — King & Spalding LLP

(57) **ABSTRACT**

A mass notification system is disclosed. The system can include a communication network. The system can also include a number of network devices communicably coupled to the communication network, where at least two of the network devices are configured to generate a communication substantially simultaneously. The system can further include a server communicably coupled to the communication network and configured to control the plurality of network devices, where the server instructs the at least two of the plurality of network devices to generate the communication. The system can also include a first client communicably coupled to the communication network and comprising a user interface, where the first client is configured to communicate, via the user interface, with the server and the plurality of network devices.

18 Claims, 7 Drawing Sheets



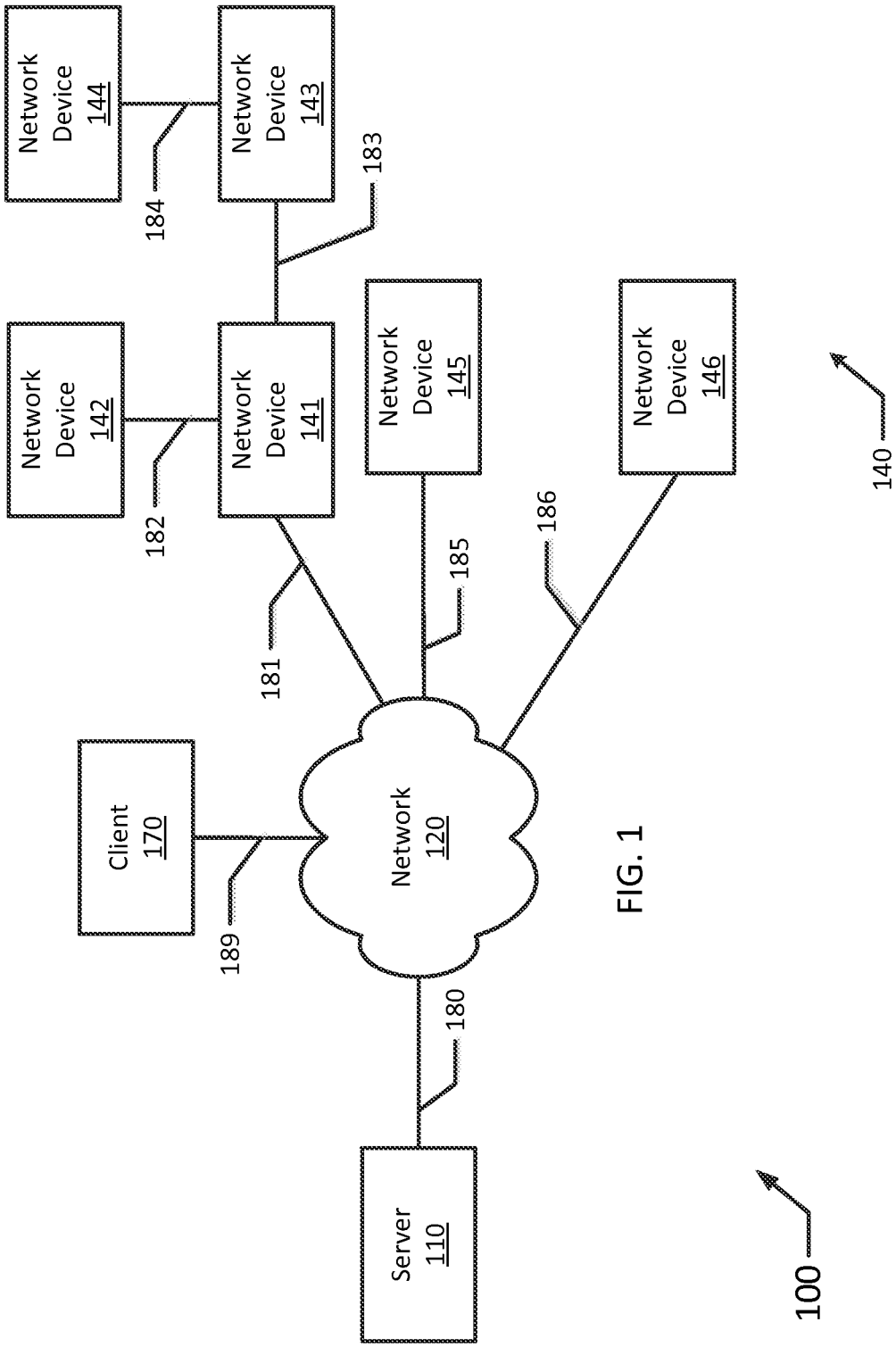

Network Device 144
Network Device 143
184
183
Network Device 142
Network Device 141
Network Device 145
Network Device 146
182
181
185
186
140
Client 170
Network 120
189
180
Server 110
100

FIG. 1

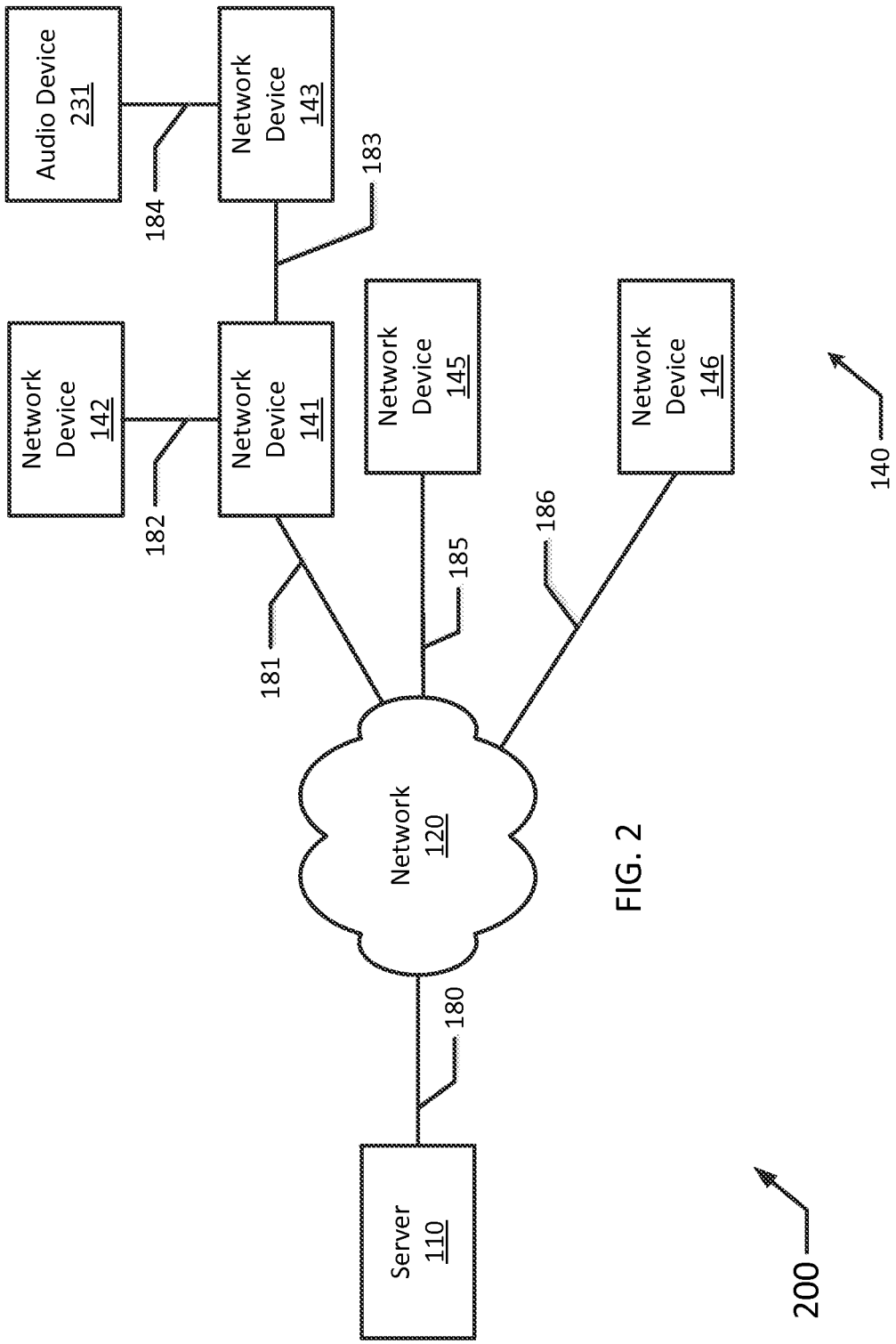

Audio Device 231
Network Device 143
184
183
Network Device 142
Network Device 141
Network Device 145
Network Device 146
182
181
185
186
140
Network 120
180
Server 110
200

FIG. 2

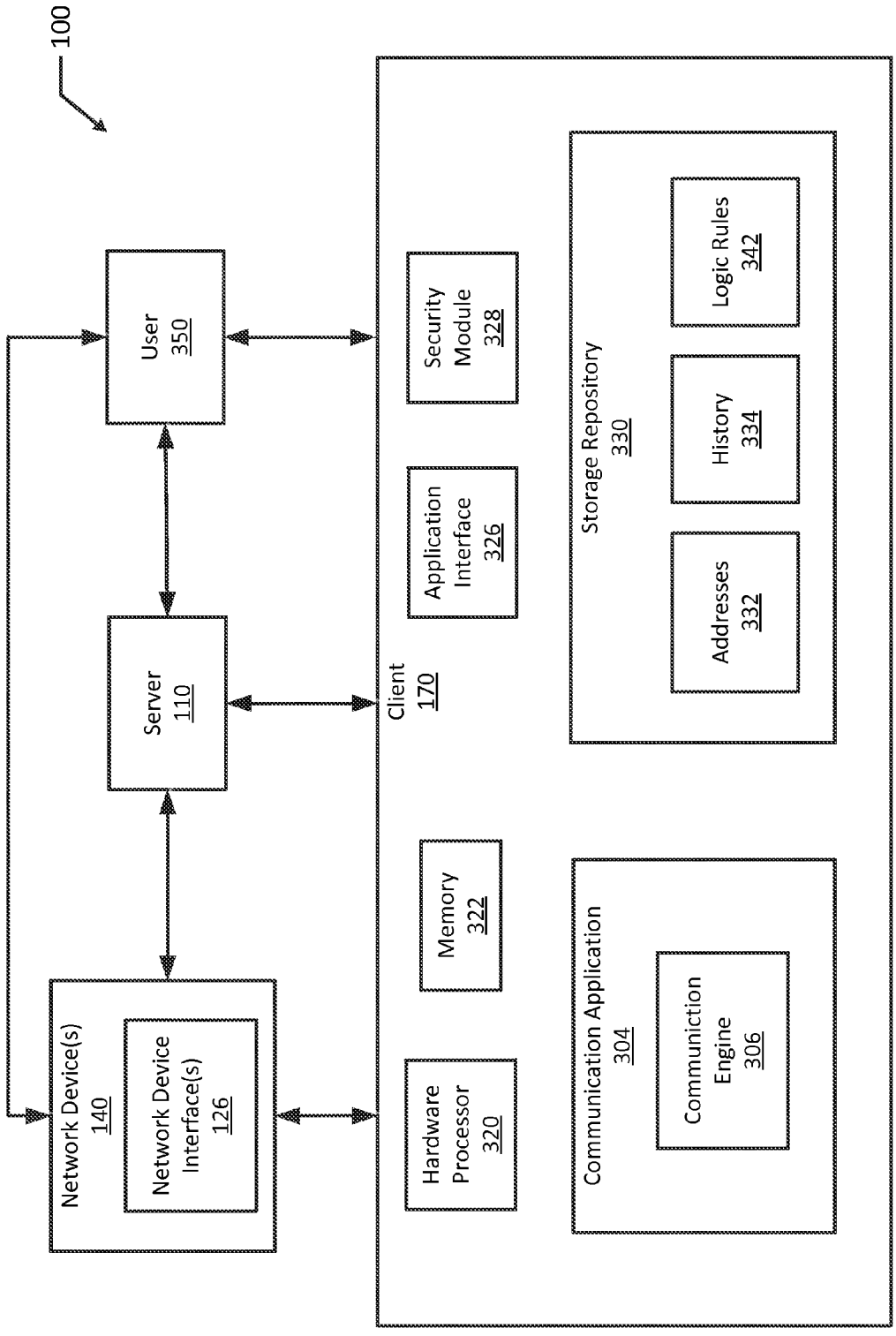

100
User 350
Server 110
Network Device(s) 140
Network Device Interface(s) 126
Client 170
Security Module 328
Application Interface 326
Storage Repository 330
Logic Rules 342
History 334
Addresses 332
Memory 322
Hardware Processor 320
Communication Application 304
Communiction Engine 306

FIG. 3

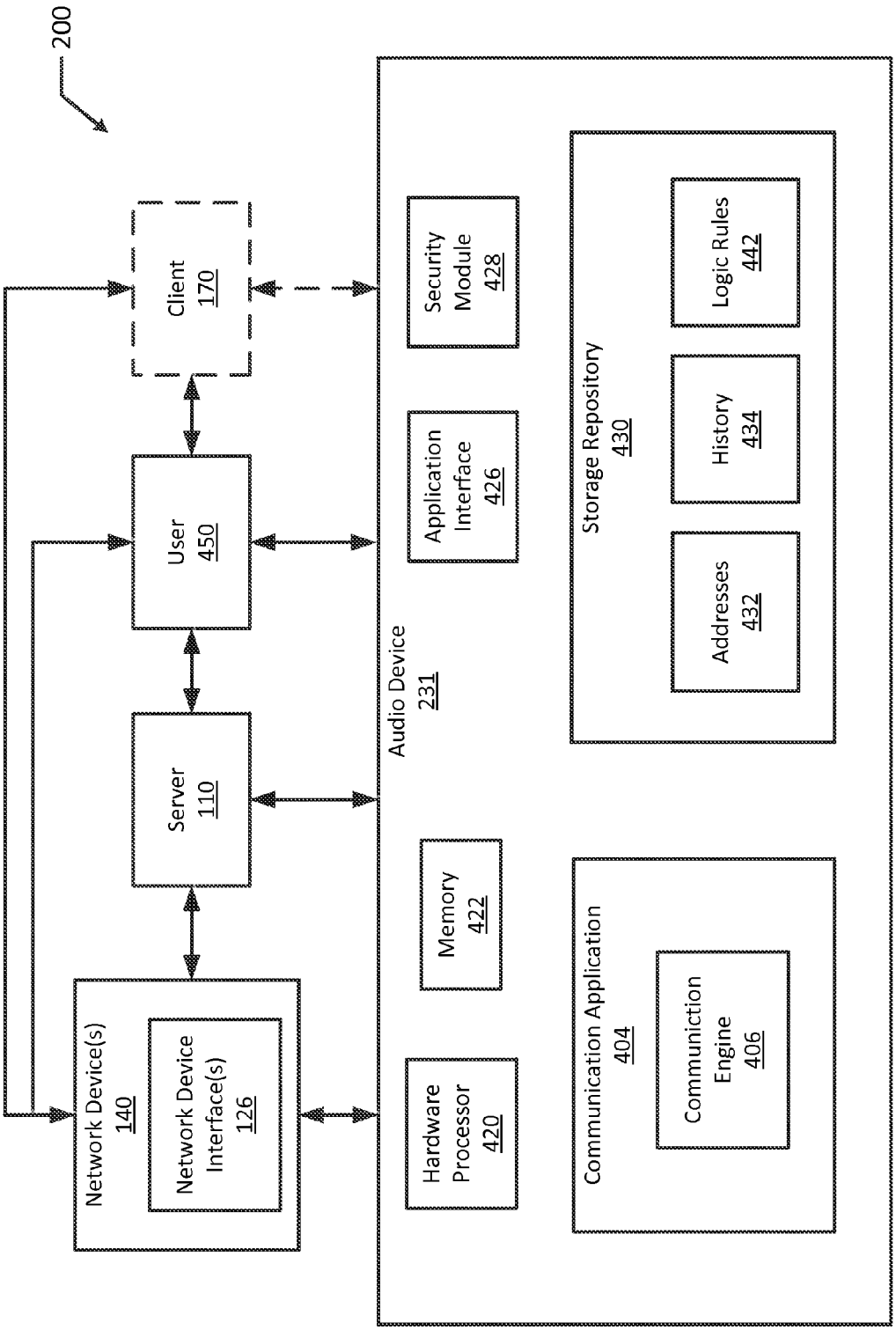

200
Client 170
User 450
Server 110
Network Device(s) 140
Network Device Interface(s) 126
Audio Device 231
Security Module 428
Application Interface 426
Storage Repository 430
Logic Rules 442
History 434
Addresses 432
Memory 422
Hardware Processor 420
Communication Application 404
Communiction Engine 406

FIG. 4

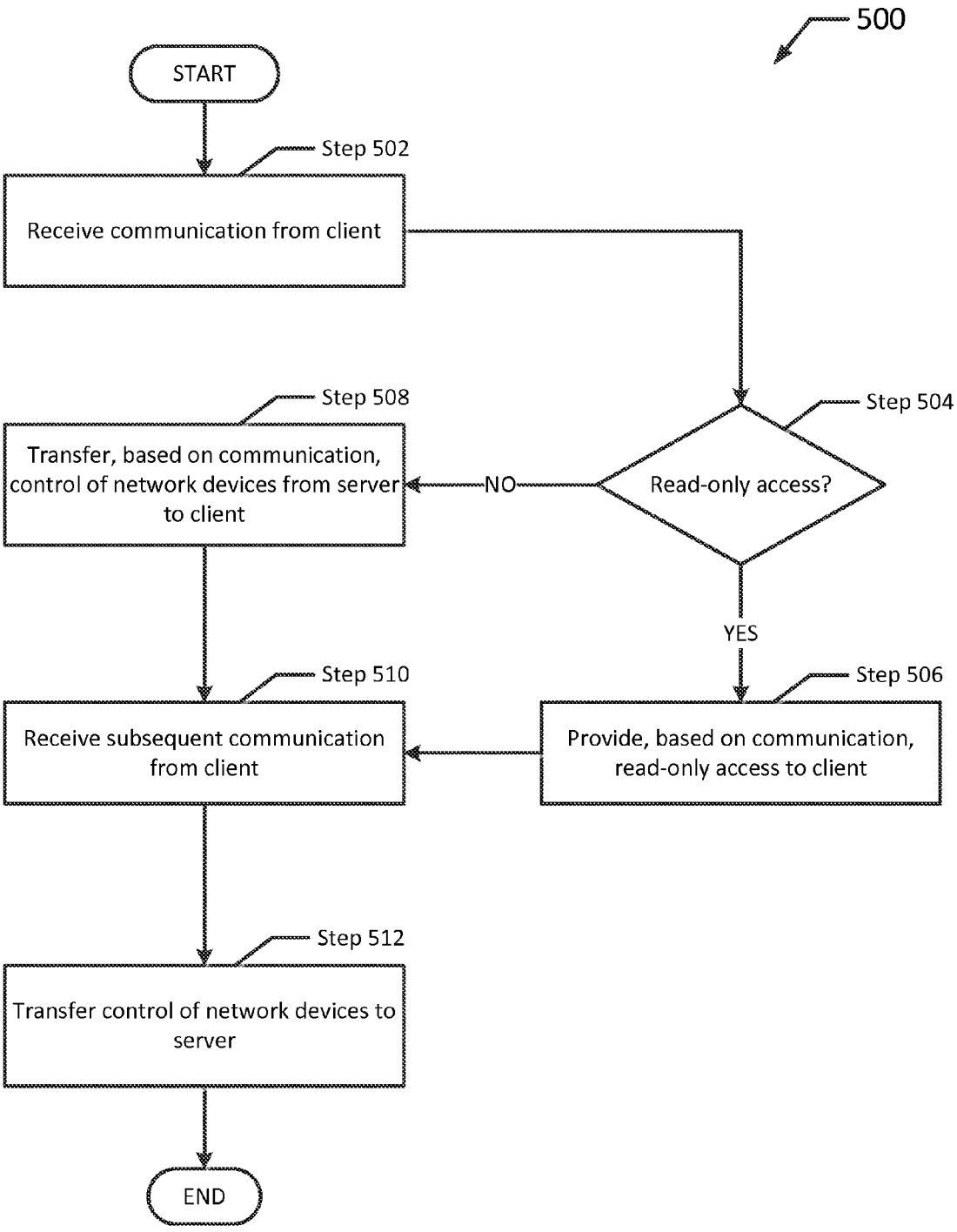

500
START
Step 502
Receive communication from client
Step 504
Read-only access?
NO
YES
Step 508
Transfer, based on communication, control of network devices from server to client
Step 506
Provide, based on communication, read-only access to client
Step 510
Receive subsequent communication from client
Step 512
Transfer control of network devices to server
END

FIG. 5

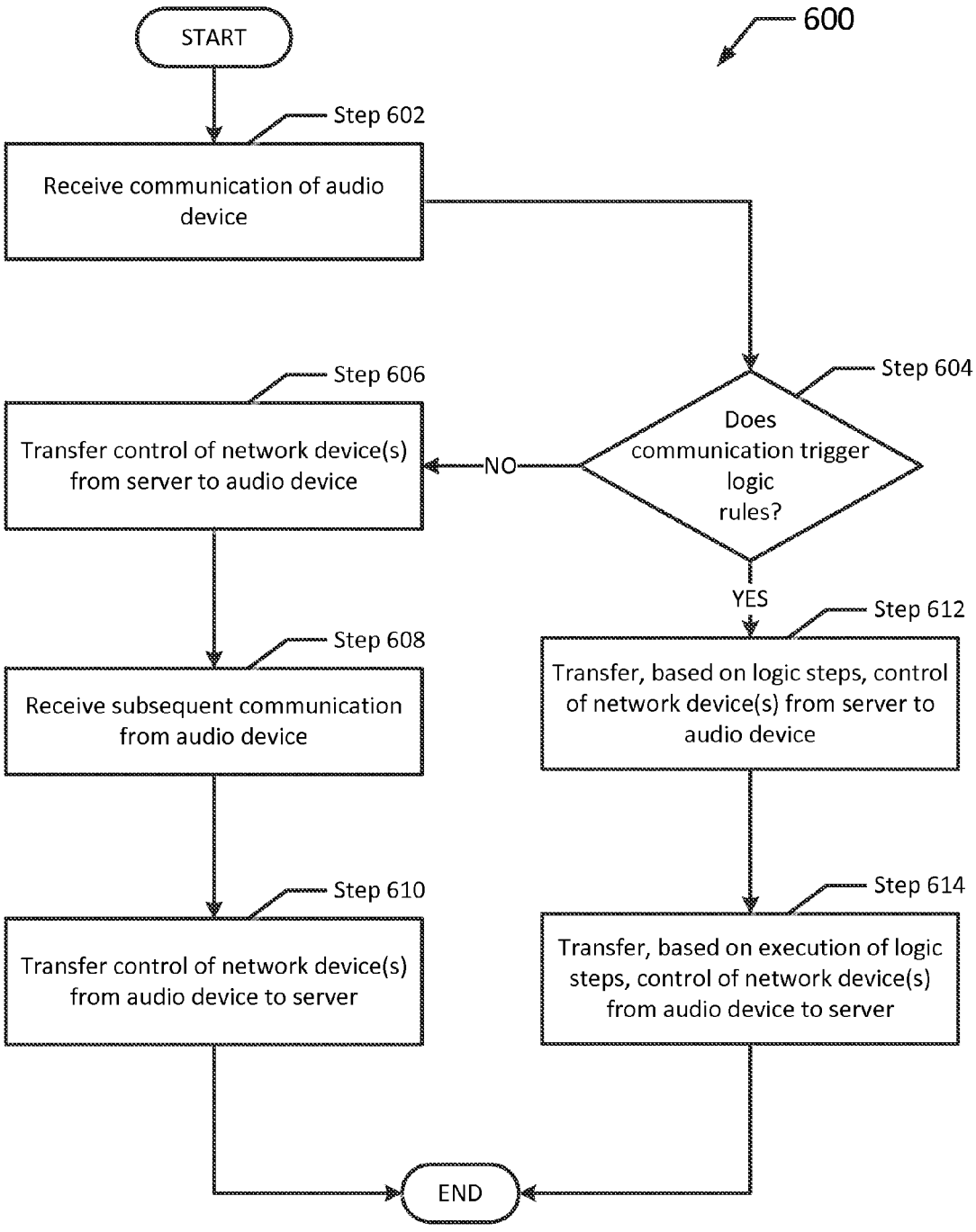

600
START
Step 602
Receive communication of audio device
Step 604
Does communication trigger logic rules?
NO
Step 606
Transfer control of network device(s) from server to audio device
YES
Step 612
Transfer, based on logic steps, control of network device(s) from server to audio device
Step 608
Receive subsequent communication from audio device
Step 610
Transfer control of network device(s) from audio device to server
Step 614
Transfer, based on execution of logic steps, control of network device(s) from audio device to server
END

FIG. 6

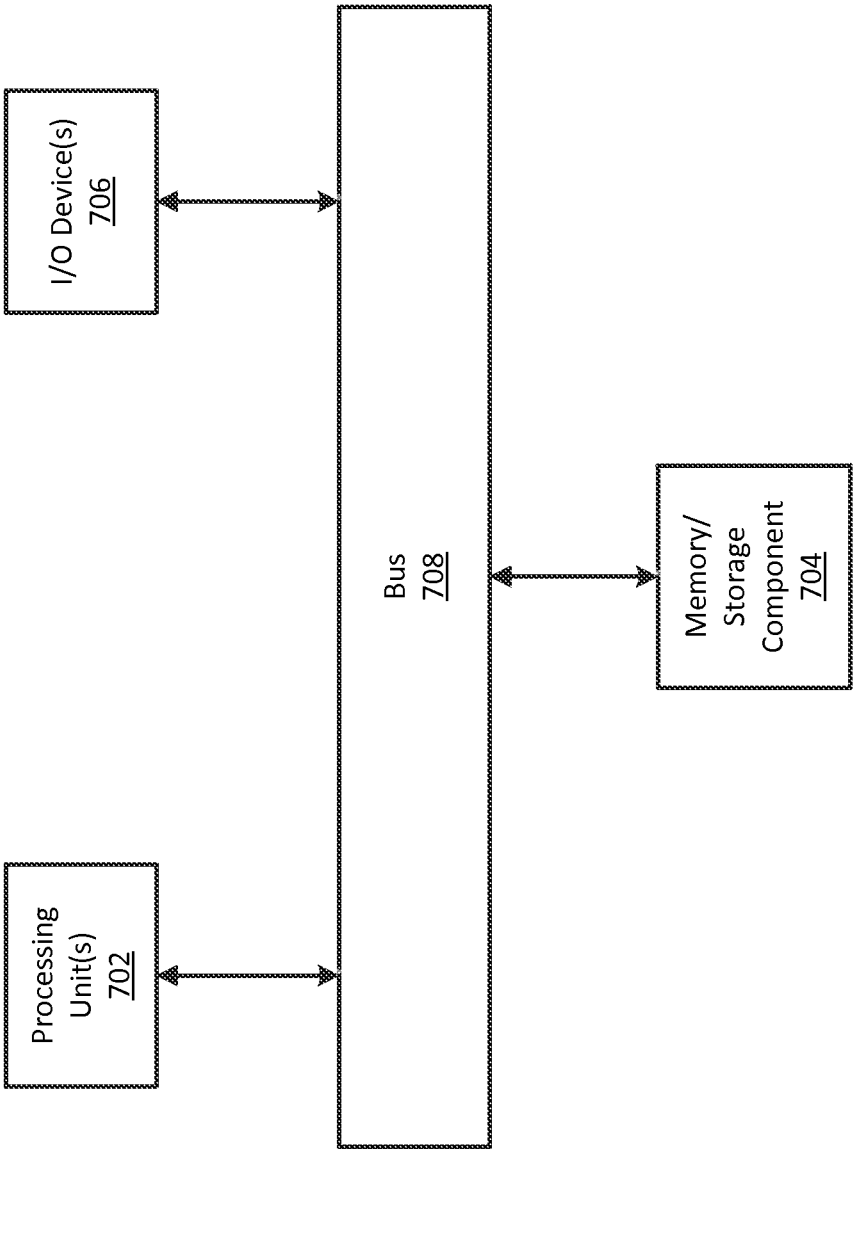

I/O Device(s)
706
Bus
708
Memory/
Storage
Component
704
Processing
Unit(s)
702
700

FIG. 7

MASS NOTIFICATION SYSTEMS

TECHNICAL FIELD

Embodiments described herein relate generally to a communication system, and more particularly to systems, methods, and devices for mass notification systems.

BACKGROUND

Mass notification systems are designed to provide information to people at different locations at substantially the same time. A mass notification system can involve the use of audio and/or visual devices in communicating the information. The information can relate to an emergency (e.g., fire, tornado, hazardous spill) or a non-emergency situation. Some or all of the mass notification system can be located indoors and/or outdoors. A mass notification system can cover a particular geographic area (e.g., a building floor, entire building, a campus, a town) or a number of geographic areas (e.g., a number of towns within a county, a number of buildings owned by a company throughout the country).

SUMMARY

In general, in one aspect, the disclosure relates to a mass notification system. The mass notification system can include a communication network. The mass notification system can also include a number of network devices communicably coupled to the communication network, where at least two of the network devices are configured to generate a notification substantially simultaneously. The mass notification system can further include a server communicably coupled to the communication network and configured to control the network devices, where the server instructs the at least two of the network devices to generate a notification. The mass notification system can also include a first client communicably coupled to the communication network and having a user interface, where the first client is configured to communicate, via the user interface, with the server and the network devices.

In another aspect, the disclosure can generally relate to a mass notification system. The mass notification system can include a communication network. The mass notification system can also include a number of network devices communicably coupled to the communication network, where at least two of the network devices are configured to generate a notification substantially simultaneously, where the at least two of the network devices includes an audio device. The mass notification system can further include a server communicably coupled to the communication network and configured to control the network devices. The audio device can be a source of audio for a remainder of the at least two of the network devices. The source of audio generated by the audio device and delivered to the remainder of the at least two of the network devices overrides the server.

In another aspect, the disclosure can generally relate to a method for controlling a mass notification system. The method can include receiving a communication from a client communicably coupled to the mass notification system, wherein the mass notification system is controlled by a server. The method can also include transferring, in response to the communication, control of the notification system to the client. The mass notification system can include a number of network devices configured to generate a notification substantially simultaneously based on a subsequent communication from the client.

These and other aspects, objects, features, and embodiments will be apparent from the following description and the appended claims.

BRIEF DESCRIPTION OF THE DRAWINGS

The drawings illustrate only example embodiments of mass notification systems and are therefore not to be considered limiting of its scope, as mass notification systems may admit to other equally effective embodiments. The elements and features shown in the drawings are not necessarily to scale, emphasis instead being placed upon clearly illustrating the principles of the example embodiments. Additionally, certain dimensions or positionings may be exaggerated to help visually convey such principles. In the drawings, reference numerals designate like or corresponding, but not necessarily identical, elements.

FIG. **1** shows a system diagram of a mass notification system in accordance with certain example embodiments.

FIG. **2** shows a system diagram of another mass notification system in accordance with certain example embodiments.

FIG. **3** shows a diagram of the mass notification system of FIG. **1** in accordance with one or more example embodiments.

FIG. **4** shows a diagram of the mass notification system of FIG. **2** in accordance with one or more example embodiments.

FIG. **5** shows a flowchart of a method in accordance with one or more example embodiments.

FIG. **6** shows a flowchart of another method in accordance with one or more example embodiments.

FIG. **7** shows a computing device in accordance with one or more example embodiments.

DETAILED DESCRIPTION OF EXAMPLE EMBODIMENTS

The example embodiments discussed herein are directed to systems, apparatuses, and methods of mass notification systems. Mass notification systems as described herein can be used in one or more of a number of applications. Such applications can include, but are not limited to, mass notification, office work stations, fire alarm and protection, public address/general address, paging, emergency response, emergency preparedness, tornado warning, security, and surveillance. Thus, the examples of mass notification systems described herein are not limited to a particular application.

Any communications sent and received between one or more components (e.g., server, network device(s), client(s), audio device(s)) within a mass notification system described herein can use one or more of a number of communication protocols. Consequently, regardless of the communication protocol used, a communication sent by one component of the mass notification system can be addressed to one or more other specific components of the mass notification system. In other words, a communication generated and sent by a component of a mass communication system can be received and interpreted by the intended recipient component(s) of the mass communication system.

A mass notification system as described herein can be called one or more of a number of other names, including but not limited to a fire alarm system, a paging system, a public address/general address system, and a tornado warning system. Example embodiments can be used in one or more of a variety of environments, indoors or outdoors, where the light fixture can be mounted and exposed. Example environments

can include, but are not limited to, conditions with moisture, humidity, dirt, exhaust fumes, vibrations, potential explosions, and noise.

Example embodiments of mass notification systems will be described more fully hereinafter with reference to the accompanying drawings, in which example embodiments of communicating with network devices are shown. Mass notification systems may, however, be embodied in many different forms and should not be construed as limited to the example embodiments set forth herein. Rather, these example embodiments are provided so that this disclosure will be thorough and complete, and will fully convey the scope of mass notification systems to those of ordinary skill in the art. Like, but not necessarily the same, elements (also sometimes called components) in the various figures are denoted by like reference numerals for consistency. Terms such as "first," "second," "top," "base," "open," and "closed" are used merely to distinguish one component (or part of a component or state of a component) from another. Such terms are not meant to denote a preference or a particular orientation.

FIG. **1** shows a system diagram of a mass notification system **100** in accordance with certain example embodiments. The mass notification system **100** of FIG. **1** can include a server **110**, one or more network devices **140** (e.g., network device **141**, network device **142**, network device **143**, network device **144**, network device **145**, network device **146**), at least one communication channel (e.g., communication channel **180**, communication channel **181**, communication channel **182**, communication channel **183**, communication channel **184**, communication channel **185**, communication channel **186**, communication channel **189**), a network **120**, and a client **170**.

Those skilled in the art will appreciate that a number of configurations of a mass notification system can be used, and that the configuration of the mass notification system **100** of FIG. **1** is only one example. The server **110** is communicably coupled to each of the network devices **140** and the client **170**. The various communication channels and the network **120** can collectively be called a communication network. Each point (wireless or hardwired) on the communication network where a device (e.g., a network device **140**, a client **170**, a server **110**) are communicably coupled can be called a node.

The server **110** can be any type of device capable of generating, sending, receiving, and interpreting communications. The communications generated and sent by the server **110** are sent to one or more of the network devices **140** and/or the client **170**. The communications sent by the server **110** can be sent through one or more communication channels (e.g., communication channel **180**) to the network **120**, and then from the network **120** through one or more communication channels (e.g., communication channel **181**, communication channel **189**) to one or more of the network devices **140** and/or the client **170**. For example, in this case, communication channel **185** allows communications to be sent between the network **120** and network device **145**. As another example, communication channel **181** allows communications to be sent between the network **120** and network device **141**. As a further example, communication channel **189** allows communications to be sent between the network **120** and the client **170**.

In certain example embodiments, a communication generated and sent by the server **110** instructs two or more network devices **140** to generate and/or output a notification. If a network device **140** is generating a notification, the communication can include details of the content of the notification. A communication sent by the server **110** to two or more network devices **140** can instruct those network devices **140** to output a notification at substantially the same time. For example, the server **110** can instruct a number of speakers (network devices **140**) to output a certain alarm noise substantially simultaneously to indicate that a fire has been detected. A communication generated and sent by the server **110** can also instruct two or more network devices **140** to stop generating and/or outputting a notification.

In some cases, one or more communication channels and/or networks can be operably between two or more network devices **140**. For example, as shown in FIG. **1**, communication channel **183** can allow communications to be sent between network device **141** and network device **143**. As another example, communication channel **182** can allow communications to be sent between network device **141** and network device **142**. As yet another example, communication channel **184** can allow communications to be sent between network device **144** and network device **143**.

Similarly, one or more of the network devices **140** can generate and send communications to the server **110** using the same communication channels. The network devices **140** can be any type of device capable of receiving and interpreting communications from the server **110**. In addition, a network device **140** can generate a response based on a communication received from the server **110** and send such response (another communication) through the network and communication channel(s) to the server **110**. In certain example embodiments, one or more of the network devices **140** is an audio device, as described below with respect to FIG. **2**.

In certain example embodiments, a network device **140** can generate and/or output a notification. Such a notification can be based on the configuration of the network device **140**. For example, a network device **140** that is a speaker can give a notification in the form of sound (audio). In such a case, the sound can vary depending on the reason for the notification. For example, the sound can be a noise indicating a fire. As another example, the sound can be a different noise indicating a tornado. As another example, the sounds can be yet another noise indicating that there is no longer a threat of danger. Examples of a network device **140** can include, but is not limited to, a fire alarm, a fire alarm control panel (FACP), a desktop computer, an alarm panel, a loudspeaker, a radio, an egress light, a speaker, a printer, a fax machine, a copier, and a mobile device. A network device **140** can be called by one or more of a number of other names. For example, a network device **140** can be called an Internet protocol communicator or an IP communicator.

The communication channels described herein use wired and/or wireless technology. The network **120** can include one or more systems and/or devices for routing communications between the network devices **140**, the client **170**, and the server **110** through the appropriate communication channels. The network **120** can use or include the Internet, an intranet, an Ethernet, and/or some other system of digital communication. The network **120** can use wired and/or wireless technology. The network **120** can be configured so that one or more network devices **140**, the client **170**, and/or the server **110** can be added, removed, and/or otherwise altered to change the mass notification system **100**.

The network **120** can use one or more Internet protocols or other communication protocols for routing the various communications throughout the mass notification system **100**. Examples of a communication protocol used for a communication generated and sent by the server **110** to a particular network device **140** and/or the client **170** can include a transmission control protocol/Internet protocol (TCP/IP) address or connection and a multi-cast network protocol. In some

cases, the network **120** can be bypassed so that there is a direct connection between the server **110** and a network device **140** and/or the client **170**.

In certain example embodiments, the client **170** is a device that has read-only access to the server **110**, one or more network devices **140**, and/or any other part of the mass notification system **100**. Alternatively, the client **170** can control some or all of the mass notification system **100**, overriding the server **110** in the control of such portions of the mass notification system **100**. As another alternative, the client **170** can control the server **110** as well as one or more of the network devices **140**. The client **170** can have a user interface (e.g., a graphical user interface (GUI)) to allow a user (defined below) to generate commands, generate reports, monitor a real-time status of a network device **140**, control a network device **140**, and/or otherwise interact with some or all of the mass notification system **100**.

A mass notification system **100** can include more than one client **170**. Each client **170** can be permanently or detachably communicably coupled to the communication network of the mass notification system **100**. A client **170** that is detachably coupled to the communication network of the mass notification system **100** can communicably couple to the communication network at one or more nodes. In such a case, the client **170** can be portable. The client **170** can also be portable while communicably coupled to a single node of the communication network of the mass notification system **100**, as when the coupling node uses wireless technology. If a client **170** can be communicably coupled to multiple nodes of the communication network of the mass notification system **100**, the client **170** can be communicably coupled to one node at one point in time, and the client **170** can be communicably coupled to another node of the communication network of the mass notification system **100** at another point in time.

If there are multiple clients **170**, and if two or more of those clients **170** are attempting to perform a conflicting function (e.g., turn on/off a network device **170**), either with each other or with the server **110**, the conflict can be resolved using one or more of a number conflict resolution protocols (e.g., logic rules). Such conflict resolution protocols can be based on one or more of a number of factors, including but not limited to the time order of events, a priority (e.g., based on user login) established by a certain client **170**, and the function of the network device **140** that is the subject of the conflict. More information about the client **170** is discussed below with respect to FIG. **3**.

In certain example embodiments, a communication generated and sent by the client **170** instructs two or more network devices **140** to generate and/or output a notification. If a network device **140** is generating a notification, the communication can include details of the content of the notification. A communication sent by the client **170** to two or more network devices **140** can instruct those network devices **140** to output a notification at substantially the same time. For example, the client **170** can instruct a number of speakers (network devices **140**) to output a certain alarm noise substantially simultaneously to indicate that a fire has been detected. A communication generated and sent by the client **170** can also instruct two or more network devices **140** to stop generating and/or outputting a notification.

The server **110** can control, in the absence of the client **170** when the client **170** is in some form of control, all network devices **140** within the mass notification system **100** using the communication network. Typically, the server **110** is a computer system (a general example of which is described below with respect to FIG. **7**) that controls the network devices **140** based on one or more of a number factors, including but not limited to software instructions or other logic steps, a user command, default instructions, passage of time, the occurrence of an event (e.g., detection of a fire), and/or some other factor.

In certain example embodiments, the server **110** detects the client **170** when the client **170** is communicably coupled to the communication network of the mass notification system **100**. The server **110** can detect the client **170** automatically, based on a communication sent by the client **170** and received by the server **110**, based on the occurrence of an event, and/or based on some other event. When the server **110** detects the client **170**, the server **110** can allow the client **170** to have an amount of access and/or control over some or all of the network devices **140** in the mass notification system **100**. In such a case, the amount of access can include, but is not limited to, read-only access, complete control, conditional control (e.g., control is granted to the client **170** by the server **110** if one or more certain conditions are satisfied), fixed duration control (e.g., control is granted to the client **170** by the server **110** for a specific period of time), and variable duration control (e.g., control is granted to the client **170** by the server **110** for a period of time that is based on the satisfaction of one or more conditions).

FIG. **2** shows a system diagram of another mass notification system **200** in accordance with certain example embodiments. In one or more embodiments, one or more of the components shown in FIG. **2** may be omitted, added, repeated, and/or substituted. Accordingly, embodiments of mass notification systems should not be considered limited to the specific arrangements of components shown in FIG. **2**. The mass notification system **200** of FIG. **2** can be substantially similar to the mass notification system **100** of FIG. **1**, except as described below. For example, the server **110**, the communication network, and one or more of the network devices **140** can be substantially the same between the mass notification system **100** of FIG. **1** and the mass notification system **200** of FIG. **2**. In the mass notification system **200** of FIG. **2**, the client (substantially similar to the client **170** of FIG. **1**) can be omitted. Alternatively, one or more clients can be included in the mass notification system **200**.

In certain example embodiments, the mass notification system **200** of FIG. **2** includes one or more audio devices (e.g., audio device **231**). An audio device can be, or be part of, a network device **140**. An audio device can be a source of audio for at least one network device **140** in the mass notification system **200**. For example, for the mass notification system **200** shown in FIG. **2**, the audio device **231** can be a source of audio for network device **142** and network device **146**. In order for the audio device **231** to provide audio to a network device **140**, the audio device **231** can be communicably coupled to the communication network of the mass notification system **200**. Specifically, the audio device **231** can be communicably coupled to one or more nodes of the communication network. When the audio device **231** is communicably coupled to the communication network, the audio device **231** can override the server **110**.

As with the client **170** described above with respect to FIG. **1**, an audio device **231** can be fixedly or detachably coupled to the communication network of the mass notification system **200** using one or more nodes. In either case, the audio device **231** can be portable. For example, the audio device **231** can be communicably coupled to one node at one point in time, and the audio device **231** can be communicably coupled to another node of the communication network of the mass notification system **200** at another point in time. The audio device **231** can be communicably coupled to a node using wired and/or wireless technology. In the example of FIG. **1**,

the audio device **231** is communicably coupled to the communication network at communication channel **184**.

In certain example embodiments, a communication generated and sent by the audio device **231** instructs two or more network devices **140** to generate and/or output a notification. If a network device **140** is generating a notification, the communication can include details of the content of the notification. A communication sent by the audio device **231** to two or more network devices **140** can instruct those network devices **140** to output a notification at substantially the same time. For example, the audio device **231** can instruct a number of speakers (network devices **140**) to output a certain alarm noise substantially simultaneously to indicate that a fire has been detected. A communication generated and sent by the audio device **231** can also instruct two or more network devices **140** to stop generating and/or outputting a notification. More information about the audio device **231** is discussed below with respect to FIG. **4**.

The server **110**, a client **170**, an audio device **231**, and/or a network device **140** can send communications (e.g., commands, requests for information, broadcast data or information) to one or more other components of a mass notification system. Such communications serve one or more of a number of purposes. For example, a communication can change the state of one or more network devices **140**, receive the status of one or more network devices **140**, repeat a command to change the status of one or more network devices **140**, or perform some other function. In certain example embodiments, the server **110** in a mass notification system (e.g., mass notification system **100**, mass notification system **200**) can be a network device in a larger mass notification system.

FIG. **3** shows a diagram of the mass notification system **100** of FIG. **1** in accordance with one or more example embodiments. The mass notification system **100** can be part of the mass notification system (e.g., mass notification system **100**) described above with respect to FIG. **1**. The mass notification system **100** can include the server **110**, one or more network devices **140**, a user **350**, and a client **170**. The client **170** can include a communication application **304**, a storage repository **330**, a hardware processor **320**, a memory **322**, an application interface **326**, and, optionally, a security module **328**. The communication application **304** can include a communication engine **306**. The storage repository **330** can include addresses **332**, history **334**, and logic rules **342**. The one or more network devices **140** can include a network device interface **126**.

Each of these components is described in further detail below. Example embodiments are not limited to the configuration shown in FIG. **3** and discussed herein. Additionally, although certain components have been enumerated as being part of the mass notification system **100**, it is understood that some components are combined with other components and/or some components are further divided into additional components in other alternative example embodiments.

In one or more example embodiments, the client **170** is implemented according to a client-server topology. The client **170** may correspond to enterprise software running on one or more servers, and in some embodiments may be implemented as a peer-to-peer system, or resident upon a single computing system. In addition, the client **170** may be accessible from other machines using one or more network device interfaces **126**, server interfaces, and/or user interfaces. In one or more example embodiments, the client **170** may be accessible over a network (e.g., network **120**), such as the Internet, by the server **110** and/or one or more users **350**. Further, information and/or services provided by the client **170** may also be stored and accessed over the network.

Alternatively or additionally, in one or more example embodiments, the client **170** is a local computer system of the user **350**. In such embodiments, the client **170** is, optionally, not implemented using a client-server topology. For example, client **170** can correspond to a laptop computer, desktop computer, mobile device, another type of computing device, or a combination of multiple computing devices. Additionally or alternatively, the client **170** can be a distributed computer system and/or a multi-processor computer system in which the computer system includes multiple distinct computing devices.

Continuing with FIG. **3**, a user **350** as described herein may be any person that is involved with the removal, installation, operation, and/or maintenance of a mass notification system and/or devices (e.g., network device **140**, client **170**) within a mass notification system. Examples of a user may include, but are not limited to, a company representative, an electrician, an engineer, a mechanic, an operator (local or remote), a consultant, a contractor, and a manufacturer's representative. A user **350** can interact with a mass notification system or any portion thereof directly or remotely.

The user **350** uses one or more applications to communicate with the client **170**, the server **110**, and/or one or more network devices **140** in accordance with one or more example embodiments. For example, the user **350** can receive a notification from the client **170** as to the operation or lack of operation of a particular network device **140**. According to some example embodiments, the user **350** sends information (e.g., user preferences, settings, data) to the client **170**, the server **110**, and/or the network devices **140** in a number of manners (e.g., modes of communication), including but not limited to a direct input, over the Internet, some other suitable mode for sending information, or any combination thereof.

In certain example embodiments, the information sent by the user **350** to the client **170**, the server **110**, and/or the network devices **140** is delivered automatically (e.g., according to a default setting, a consumer preference, an occurrence of an event) or on demand, for example, in response to a notice from the client **170**, the server **110**, and/or a network device **140**. The client **170**, the server **110**, and/or the network devices **140** interact with the user **350** in the same manner that the user **350** interacts with the client **170**, the server **110**, and/or the network devices **140**, or in a different manner using different modes of communication. The user **350** can use a user system (not shown), which is discussed below in further detail, to interact with the client **170**, the server, and/or the network devices **140** using software (not shown) in accordance with one or more example embodiments.

In one or more example embodiments, each network device **140**, using a network device interface **126**, sends communications (e.g., responses, information) to, and receives communications (e.g., a request for information, a command) from, the client **170**. The communications can be delivered automatically (e.g., according to a default setting, a marketing entity preference, an occurrence of an event) or on demand, as from a request made by the client **170**. The communications provided by the network devices **140** can include, but are not limited to, the status of the network device **140**, an acknowledgment of receipt of a communication from the client **170**, and a change in the status of the network device **140**.

Each network device **140**, using a network device interface **126**, can interact with the client **170** in the same mode of communication that the client **170** interacts with the network device **140** or using different modes of communication in alternative example embodiments. In one or more example embodiments, each network device **140** uses a system (not

shown) to interact with the client **170** using the network device interface **126** and network device software, which is discussed in further detail below. The client **170** also can be implemented as a browser extension according to some example embodiments. In such a scenario, user software and/or network device software interacts directly with the client **170** as a browser extension.

In addition to sending and receiving communications, the network device interface **126** of each network device **140** can interpret a communication sent by the client **170**. The network device interface **126** of each network device **140** can also generate a response and/or other form of communication that is sent to the client **170**. Such a response and/or other form of communication can include content (e.g., addresses **332**) to identify the network device **140** and the client **170**.

The network device interface **126** of a network device **140** mass notification system **100** can also determine which communication channel(s) and/or which protocol to use in sending a communication to the client **170**. In some cases, the network device interface **126** of a network device **140** can choose one or more communication channel(s) and/or a protocol based on the corresponding communication received from the client **170**.

Continuing with FIG. **3**, the client **170** can interact with the user **350**, the server **110**, and/or each network device **140** using an application interface **326** in accordance with one or more example embodiments. Specifically, the application interface **326** of the client **170** receives input (communications) from and sends output (communications) to the user **350**, the server **110**, and/or each network device **140**. The user **350**, the server **110**, and/or each network device **140** can include an interface to receive communications from and send communications to the client **170** in certain example embodiments. Examples of this interface include, but are not limited to, a graphical user interface, an application programming interface, a keyboard, a monitor, a mouse, a web service, a data protocol adapter, some other hardware and/or software, or any suitable combination thereof.

In one or more embodiments of the invention, the communications received by the application interface **326** can include, but is not limited to, state of operation, user preferences, commands, settings, and feedback. The communications sent by the application interface **326** can include, but is not limited to, a request for status of a network device **140**, device communication from the server **110**, a command to change the status of a network device **140**, and a request for additional information. The communication sent by the application interface **326** can specify, but is not limited to, a user **350**, the server **110**, one or more network devices **140**, a Uniform Resource Identifier (URI) (e.g., a Uniform Resource Locator (URL), a web address, etc.), information generated by and/or requested by the communication engine **306**, some other software or source of information, or any suitable combination thereof.

In one or more example embodiments, the communications transferred among the application interface **326**, the user **350**, server **110**, and/or each network device **140** corresponds to metadata associated with such information. In this case, the metadata describes the data specified (i.e., the metadata provides context for the specified data). In one or more example embodiments, the client **170**, the server **110**, and/or one or more network devices **140** supports various data formats provided by the user **350** and/or one or more other network devices **140**.

Continuing with FIG. **3**, the client **170** retrieves and stores addresses **332**, history **334**, and logic rules **342**. More specifically, the client **170** uses the communication engine **306** to retrieve and store addresses **332**, history **334**, and logic rules **342** in the storage repository **330** in accordance with one or more example embodiments.

In one or more example embodiments, an address **332** is a unique identifier (sometimes called a target address) for a network device **140**, another client **170**, and/or the server **110**. The addresses **332** of the storage repository **330** can include the address of some or all of the network devices **140** in the mass notification system **100**. An address can also be the unique identifier of the client **170**. Each address is fixed in certain example embodiments, or is adjusted based on a logic rule, user input, and/or any other information that can affect or alter an address.

In one or more example embodiments, the history **334** of the storage repository **330** is based on previous communications sent and/or received by the client **170**. Some or all history **334** can be stored in the storage repository **330**. For example, only the previous 24 hours of communications may be stored in the history **334** of the storage repository **330**. The history can be associated with a time. Time in this case can be a clock time, an interval of time, or some other measure of time. Thus, when history **334** is stored in the storage repository **330**, the history **334** can be associated with a network device **140** (based, for example, on the addresses **332**) and/or with a particular time. In this way, the client **170** can measure the current state of one or more network devices **140** and/or the server **110**, and/or whether the one or more network devices **140** and/or the server **110** has changed state compared to a communication with a network device **140** and/or the server **110** at some prior point in time.

In one or more example embodiments, the logic rules **342** of the storage repository **330** are a set of deterministic steps that the client **170**, the server **110**, and/or one or more network devices **140** must follow under certain circumstances. Specifically, the logic rules **342** represent how the client **170**, server **110**, user **350**, and network devices **140** interact with each other based on certain conditions and/or circumstances. The logic rules **342** can include allowances, prohibitions, and/or priorities. The logic rules **342** can allow certain network devices **140** to be controlled by the client **170** instead of the server **110**. Some or all of the logic rules **342** can be fixed according to some example embodiments, while in other example embodiments, one or more logic rules **342** can vary based on one or more of a number of factors, including but not limited to user input, operational history, passage of time, connectivity of the client **170** to the communication network, and function of the network device **140**.

Continuing with FIGS. **1-3**, the storage repository **330** can be a persistent storage device (or set of devices) that stores software and data used to assist the communication engine **306** in communicating with the network devices **140** within the mass notification system **100**. In one or more example embodiments, the storage repository **330** stores the addresses **332**, history **334**, and logic rules **342**. Examples of a storage repository **330** include, but are not limited to, a database (or a number of databases), a file system, a hard drive, some other form of data storage, or any suitable combination thereof. The storage repository **330** is located on multiple physical machines, each storing all or a portion of the addresses **332**, history **334**, and logic rules **342** according to some example embodiments. Each storage unit or device can be physically located in the same or different geographic location.

The storage repository **330** can be operatively connected to the communication application **304**. In one or more example embodiments, the communication application **304** includes functionality to communicate with the network devices **140** in the mass notification system **100**. More specifically, the com-

munication application **304** sends information to and/or receives information from the storage repository **330** in order to communicate with the network devices **140**, the server **110**, and/or the user **350**.

The functions of the communication application **304** can be performed on a single computing device or on multiple computing devices (for example, on different network devices **140**). When the functions of the communication application **304** are performed on multiple computing devices, a number of configurations and/or frameworks are used in certain example embodiments. The configurations and/or software frameworks are designed to work with multiple data nodes and large quantities of data. One or more calculations performed by one or more components of the communication application **304** are performed on multiple machines operating in parallel, where the results from each machine is combined to generate a result to the one or more calculations.

Each component of the communication application **304** described herein (specifically, the communication engine **306**) uses addresses **332**, history **334**, and/or logic rules **342** to generate and send a communication to the network devices **140**, the server **110**, and/or the user **350**. In one or more example embodiments, the communication engine **306** of the communication application **304** coordinates the storage repository **330** and, optionally, the security module **328**. Specifically, the communication engine **306** coordinates the transfer of information between the application interface **326** and the storage repository **330** according to certain example embodiments.

Further, the communication engine **306** also retrieves the addresses **332**, history **334**, and the logic rules **342** from, and sends the addresses **332**, history **334**, and the logic rules **342** to the storage repository **330** for use by the communication engine **306**. The communication engine **306** can also retrieve the addresses **332**, history **334**, and/or the logic rules **342** from the storage repository **330** to be sent to the server **110** and/or the user **350**.

In certain example embodiments, the communication engine **306** generates one or more communications for, and send one or more communications to, the server **110** and/or one or more network devices **140**. The communication engine **306** can generate and send communications continuously, at regular intervals, upon the occurrence of some event (e.g., a change in status of a network device **140**, a communication received from a user **350**), and/or randomly. The communication engine **306** can generate any type of communication for one or more network devices **140**, the server **110**, and/or a user **350**. Examples of such types of communication can include, but are not limited to, an instruction (e.g., to change state, to perform an operation, to allow the client **170** to control certain network devices **140**), a request for information (e.g., current status of a network device **140**), and report of status of the network devices **140**.

The type of communication generated by the communication engine **306** can be based on logic rules **342**, an instruction from the user **350**, an instruction from the server **110**, and/or some other factor. Similarly, the particular network devices **140** that are the intended recipients of a communication generated by the communication engine **306** can be determined by the communication engine **306**, logic rules **342**, the user **350**, and/or some other factor. In any case, the addresses **332** of the intended recipients are provided to the communication engine **306** by the storage repository **330**. Once received, the communication engine **306** incorporates the addresses **332** into the communication generated by the communication engine **306**.

When the communication generated by the communication engine **306** is complete, the communication engine **306** sends the communication through the various communication channels and the network **120** of the communication network. In certain example embodiments, the communication is broadcast by the communication engine **306** throughout the mass notification system **100** so that the server **110** and all network devices **140** receive the communication. Alternatively, a request can also be sent to the server **110** and/or one or more specific network devices **140** (e.g., the intended recipients) according to some example embodiments. Any communication sent and/or received by the communication engine **306** can be executed using the application interface **326**. Each communication uses the proper communication protocol, as determined by the communication engine **306**.

In addition, when the communication engine **306** receives one or more communications from the server **110**, a user **350**, and/or one or more of the network devices **140**, the communication engine **306** can determine the content of such communications. In some cases, the communication engine **306** generates a communication based on a communication received from the server **110**, a user **350**, and/or a network device **140**. In certain example embodiments, once the communication engine **306** allows the client **170** to have control over one or more network devices **140**, the communication engine **306** can generate and send subsequent signals. Such signals can be based on input from a user **350**, logic rules **342**, a response from the server **110**, and/or some other factor. The communication engine **306** can also include a counter and/or a timer to track, for example, a number of communications or an amount of time between events (e.g., communications).

The control exercised over particular network devices **140** by a client **170** can be complete (i.e., the server **110** or any other component of the mass notification system **100** cannot simultaneously control those network devices **140**) or partial (e.g., the server **110** can instruct a network device **140** to perform a task while the network device **140** is under control of the client **170**).

Continuing with FIGS. **1-3**, the hardware processor **320** within the client **170** executes software in accordance with one or more example embodiments. Specifically, the hardware processor **320** can execute software on the client **170** or any of the engines and repositories described above and shown in FIG. **3**, as well as software used by the user **350**, the server **110**, and/or one or more network devices **140**. The hardware processor **320** can be an integrated circuit, a central processing unit, a multi-core processing chip, a multi-chip module including multiple multi-core processing chips, or other hardware processor in one or more example embodiments. The hardware processor **320** is known by other names, including but not limited to a computer processor, a microprocessor, and a multi-core processor. In one or more example embodiments, the hardware processor **320** executes software instructions stored in memory **322**. The memory **322** includes one or more cache memories, main memory, and/or any other suitable type of memory. The memory **322** is discretely located on the client **170** relative to the hardware processor **320** according to some example embodiments. In certain configurations, the memory **322** also is integrated with the hardware processor **320**.

Optionally, in one or more example embodiments, the security module **328** secures interactions between the client **170**, the user **350**, the server **110**, and/or the network devices **140**. More specifically, the security module **328** authenticates communication from software based on security keys verifying the identity of the source of the communication. For example, user software may be associated with a security key

enabling the user software of the user **350** to interact with the client **170**, the server **110**, and/or the network devices **140**. Further, the security module **328** restricts receipt of information, requests for information, and/or access to information in some example embodiments.

The user software can interact with the client **170**, the server **110**, and/or the network devices **140** using a browser extension. In this case, the browser extension maintains an active session with the client **170**, the server **110**, and/or the network devices **140** after the security module **328** has authenticated the user software. For example, the browser extension can continue to interact with the client **170** as the user **350** views various web content in the user software. In this example, the browser extension receives notifications from the client **170** for presenting to the user **350**.

As discussed above, the user **350**, the client **170**, the server **110**, and network devices **140** can use their own system or share a system in certain example embodiments. Such a system can be, or contain a form of, an Internet-based or an intranet-based computer system that is capable of communicating with various software. A computer system includes any type of computing device and/or communication device, including but not limited to the client **170**. Examples of such a system can include, but are not limited to, a desktop computer with Internet or intranet access, a laptop computer with Internet or intranet access, a smart phone, a server, a server farm, and a personal digital assistant (PDA). Such a system can correspond to a computer system as described below with regard to FIG. **5**.

Further, as discussed above, such a system can have corresponding software (e.g., user software, client software, server software, network device software). The software can execute on the same or a separate device (e.g., a server, mainframe, desktop personal computer (PC), laptop, personal desktop assistant (PDA), television, cable box, satellite box, kiosk, telephone, mobile phone, or other computing devices) and can be coupled by the communication network (e.g., network **120**, Internet, Intranet, Extranet, Local Area Network (LAN), Wide Area Network (WAN), or other network communication methods) and/or communication channels, with wire and/or wireless segments according to some example embodiments. The software of one system can be a part of, or operate separately but in conjunction with, the software of another system within the mass notification system **100**.

In certain example embodiments, the client **170** does not include a hardware processor **320**. In such a case, the client **170** can include, as an example, one or more field programmable gate arrays (FPGA). Using FPGAs and/or other similar devices known in the art allows the client **170** to be programmable and function according to certain logic rules **332** and thresholds without the use of a hardware processor.

In certain example embodiments, the server **110** has many of the components (e.g., hardware processor, application interface, security module, memory, communication application, storage repository) as listed above for the client **170**. In the case of the server **110**, certain communications received from the client **170** and/or certain logic rules **342** allow the client **170** to override the server **110** to control one or more of the network devices **140**. Similarly, certain other communications received from the client **170** and/or certain other logic rules **342** allow the server **110** to resume control over one or more of the network devices **140**.

FIG. **4** shows a diagram of the mass notification system **200** of FIG. **2** in accordance with one or more example embodiments. The components of the mass notification system **200** of FIG. **4** can be substantially similar to the components of the mass notification system **100** of FIG. **3**, except as described below. In certain example embodiments, the client **170** is optional. If used, the client **170** is substantially the same as the client **170** of FIG. **3** above and can be communicably coupled to the user **350**, the server **211**, the audio device **231**, and one or more network devices **140**. In such a case, the client can be communicably coupled using the communication network.

Similarly, in certain example embodiments, the audio device **231** of FIG. **4** includes components that are substantially similar to the components of the client **170** described above with respect to FIG. **3**, except as described below. Specifically, the description for any component (e.g., hardware processor **420**, communication application **404**, storage repository **430**) of FIG. **4** not provided below can be considered substantially the same as the corresponding component (e.g., hardware processor **320**, communication application **304**, storage repository **330**) described above with respect to FIG. **3**. The numbering scheme for the components of FIG. **4** parallels the numbering scheme for the components of FIG. **3** in that each component is a three digit number, where similar components between the mass notification system **200** of FIG. **4** and the mass notification system **100** of FIG. **3** have the identical last two digits.

The audio device **231** can select the one or more network devices **140** that are to be controlled by (receive the audio output of) the audio device **231**. In such a case, the selection of the network devices **140** to be controlled by the audio device **231** can be done in one or more of a number of ways. For example, the selection of the network devices **140** to be controlled by the audio device **231** can be done by a user **350** using the application interface **426** of the audio device **231**. Alternatively, the selection of the network devices **140** to be controlled by the audio device **231** can be done by logic rules **442** (e.g., based on the node of the communication network to which the audio device **231** is communicably coupled, based on the address **432** of the audio device **231**).

As yet another alternative, the selection of the network devices **231** to be controlled by the audio device **231** can be done by the server **110**. In such a case, the server **110** can send an instruction to the particular network devices **140** to be controlled by the audio device **231** so that those network devices **140** follow the communications received from the audio device **231**. In some cases, when the server **110** sends an instruction to particular network devices **140** to be controlled by the audio device **231**, the server **110** can also send the instruction to one or more other network devices **140** to perform a task. For example, the server **110** can send a communication to a number of speaker stations (forms of network devices **140**) to transfer control of those speaker stations to the audio device **231**. In addition, the communication can also be sent by the server **110** to a control panel, another network device **140**, to display that the audio device **231** is communicably coupled to the mass notification system **200**.

The audio device **231** can also generate audio (e.g., live audio feed, recorded audio) or some other form of communication. In addition, the audio device **231** can send the audio or other form of communication to the network devices **140** controlled by the audio device **231**. In such a case, the audio device **231** can be used to selectively broadcast notification information to network devices **140** within the mass notification system **200**.

In certain example embodiments, the audio device **231** can be communicably coupled to a client **170**. In such a case, the client **170** can be used to override the control of one or more network devices **140** by the server **110** in favor of the audio device **231**. As described above, the client **170** can override the server **110** in favor of the audio device **231** in one or more

of a number ways, including but not limited to by a user **350** interacting with the application interface **326** and by logic rules **332**.

The control exercised over particular network devices **140** by the audio device **231** can be complete (i.e., the server **110**, a client **170**, or any other component of the mass notification system **200** cannot simultaneously control those network devices **140**) or partial (e.g., the server **110** can instruct a network device **140** to perform a task while the network device **140** is under control of the audio device **231**).

In certain example embodiments, the audio device **231** does not include a hardware processor **420**. In such a case, the audio device **231** can include, as an example, one or more field programmable gate arrays (FPGA). Using FPGAs and/or other similar devices known in the art allows the audio device **231** to be programmable and function according to certain logic rules **432** and thresholds without the use of a hardware processor.

FIG. **5** is a flow chart presenting a method **500** for controlling a mass notification system **100** in accordance with certain example embodiments. While the various steps in this flowchart are presented and described sequentially, one of ordinary skill will appreciate that some or all of the steps may be executed in different orders, may be combined or omitted, and some or all of the steps may be executed in parallel. Further, in one or more of the example embodiments, one or more of the steps described below may be omitted, repeated, and/or performed in a different order.

In addition, a person of ordinary skill in the art will appreciate that additional steps not shown in FIG. **5** may be included in performing this method. Accordingly, the specific arrangement of steps should not be construed as limiting the scope. Further, a particular computing device, as described, for example, in FIG. **7** below, can be used to perform one or more of the steps for the method **500** described below in certain exemplary embodiments.

Referring now to FIGS. **1-5**, the example method **500** begins at the START step and proceeds to step **502**, where a communication is received from a client **170**. The communication can be sent to the server **110** and/or one or more network devices **140**. The communication can be generated and sent by the control device **210** (or, more specifically, the communication engine **306** of the control device **210**). The communication can be sent using the communication network of the mass notification system **100**. The communication can include a unique target address **332** for the server **110** and/or each network device **140** to which the communication is intended. In step **504**, a determination is made as to whether the client **170** has read-only access. The determination can be made by the server **110**. In certain example embodiments, the determination is made based on the communication in step **502**. Alternatively, the determination is made based on logic rules. If the client **170** has read-only access, the process proceeds to step **506**. If the client **170** does not have read-only access (i.e., the client **170** can command and control the server **110** and/or one or more network devices **140**), the process proceeds to step **508**.

In step **506**, read-only access is provided to the client **170**. The read-only access can be provided by the server **110**. The read-only access can be provided to the client **170** based on the communication of step **502**. With read-only access, the client **170** can perform such passive actions as monitoring the status of one or more network devices **140**, running reports based on the performance of one or more network devices, and tracking activity of the server **110**. However, the read-only access prohibits the client **170** from controlling any network devices **140** and/or overriding the server **110**. Once read-only access is provided to the client **170**, the process proceeds to step **510**.

In step **508**, control of one or more network devices **140** is transferred to the client **170**. Control of the network devices **140** can be transferred to the client **170** by the server **110**. By having control of a network device **140**, the client **170** can not only perform the passive functions listed above with respect to step **506**, but the client **170** can also actively control the operating status (e.g., turn on/off, adjust volume, deliver audio output, set alarm) of the network device **140**. The control of the network device **140** by the client **170** can be complete or shared in some way with the server **110**.

In step **510**, a subsequent communication is received from the client **170**. The subsequent communication can be a new communication compared to the communication of step **502**. Alternatively, the subsequent communication can be a stop in a communication from the client **170**, as when the client **170** is powered down or is disconnected from the communication network. In certain example embodiments, this step **510** is optional.

In step **512**, control of the network devices **140** is transferred from the client **170**. Control of the network devices **140** is transferred from the client **170** by the server **110**. Control of the network devices **140** can be transferred from the client **170** to another client **170**, to the server **110**, to an audio device **231**, or to some other component of the mass notification system **100**. Control of the network devices **140** can be transferred based on the subsequent communication from step **510**. Alternatively, control of the network devices **140** can be transferred based on one or more other factors, including but not limited to logic rules **332**, input from a user **350**, and the passage of time. After step **512** is complete, the process can proceed to the END step.

FIG. **6** is a flow chart presenting a method **600** for controlling a mass notification system **200** in accordance with certain example embodiments. While the various steps in this flowchart are presented and described sequentially, one of ordinary skill will appreciate that some or all of the steps may be executed in different orders, may be combined or omitted, and some or all of the steps may be executed in parallel. Further, in one or more of the example embodiments, one or more of the steps described below may be omitted, repeated, and/or performed in a different order.

In addition, a person of ordinary skill in the art will appreciate that additional steps not shown in FIG. **6** may be included in performing this method. Accordingly, the specific arrangement of steps should not be construed as limiting the scope. Further, a particular computing device, as described, for example, in FIG. **7** below, can be used to perform one or more of the steps for the method **600** described below in certain exemplary embodiments.

Referring now to FIGS. **1-6**, the example method **600** begins at the START step and proceeds to step **602**, where a communication is received from an audio device **231**. The communication can be a signal of connection of the audio device **231** to the communication network of the mass notification network **200**. Alternatively, the communication can be something generated and sent by the audio device **231**. The communication can be received by the server **110** and/or a client **170**. The communication can be a request, a notification, a confirmation of connection to the communication network, or have any other purpose.

In step **604**, a determination is made as to whether logic rules **432** are triggered by the communication. In certain example embodiments, the determination is made based on one or more particulars (e.g., the content, the timing, the

recipient) of the communication in step **602**. The determination can be made by the server **110**, a client **170**, a user **350**, or some other component of the mass notification system **200**. If logic rules **432** apply, the process proceeds to step **612**. If logic rules **432** do not apply, the process proceeds to step **606**.

In step **606**, control of one or more network devices **140** is transferred to the audio device **231**. Control of the network devices **140** can be transferred to the audio device **231** can be based on something other than logic rules **432**, such as a command from a user **350** or a client **170**. Control of the network devices **140** can be transferred to the audio device **231** by the server **110**, a user **350**, and/or a client **170**. By having control of a network device **140**, the audio device **231** can actively control the operating status (e.g., turn on/off, adjust volume, deliver audio output) of the network device **140**. The control of the network device **140** by the audio device **231** can be complete or shared in some way with the server **110**, a client **170**, or some other component of the mass notification system **200**.

In step **608**, a subsequent communication is received from the audio device **231**. The subsequent communication can be a new communication compared to the communication of step **602**. Alternatively, the subsequent communication can be a stop in a communication from the audio device **231**, as when the audio device **231** is powered down or is disconnected from the communication network. In certain example embodiments, this step **608** is optional.

In step **610**, control of the network devices **140** is transferred from the audio device **231**. Control of the network devices **140** is transferred from the audio device **231** by the server **110**. Control of the network devices **140** can be transferred from the audio device **231** to a client **170**, to the server **110**, or to some other component of the mass notification system **200**. Control of the network devices **140** can be transferred based on the subsequent communication from step **608**. Alternatively, control of the network devices **140** can be transferred based on one or more other factors, including but not limited to input from a user **350** and the passage of time. After step **610** is complete, the process can proceed to the END step.

In step **612**, control of one or more network devices **140** is transferred to the audio device **231**. Control of the network devices **140** can be transferred to the audio device **231** can be based on one or more logic rules **432**. Control of the network devices **140** can be transferred to the audio device **231** by the server **110**, a user **350**, and/or a client **170**. By having control of a network device **140**, the audio device **231** can actively control the operating status (e.g., turn on/off, adjust volume, deliver audio output) of the network device **140**. The control of the network device **140** by the audio device **231** can be complete or shared in some way with the server **110**, a client **170**, or some other component of the mass notification system **200**.

In step **614**, control of the network devices **140** is transferred from the audio device **231**. Control of the network devices **140** is transferred from the audio device **231** by the server **110**. Control of the network devices **140** can be transferred from the audio device **231** to a client **170**, to the server **110**, or to some other component of the mass notification system **200**. Control of the network devices **140** can be transferred based on the logic rules **432**. After step **614** is complete, the process can proceed to the END step.

FIG. **7** illustrates one embodiment of a computing device **700** that implements one or more of the various techniques described herein, and which is representative, in whole or in part, of the elements described herein pursuant to certain exemplary embodiments. Computing device **700** is one example of a computing device and is not intended to suggest any limitation as to scope of use or functionality of the computing device and/or its possible architectures. Neither should computing device **700** be interpreted as having any dependency or requirement relating to any one or combination of components illustrated in the example computing device **700**.

Computing device **700** includes one or more processors or processing units **702**, one or more memory/storage components **704**, one or more input/output (I/O) devices **706**, and a bus **708** that allows the various components and devices to communicate with one another. Bus **708** represents one or more of any of several types of bus structures, including a memory bus or memory controller, a peripheral bus, an accelerated graphics port, and a processor or local bus using any of a variety of bus architectures. Bus **708** includes wired and/or wireless buses.

Memory/storage component **704** represents one or more computer storage media. Memory/storage component **704** includes volatile media (such as random access memory (RAM)) and/or nonvolatile media (such as read only memory (ROM), flash memory, optical disks, magnetic disks, and so forth). Memory/storage component **704** includes fixed media (e.g., RAM, ROM, a fixed hard drive, etc.) as well as removable media (e.g., a Flash memory drive, a removable hard drive, an optical disk, and so forth).

One or more I/O devices **706** allow a customer, utility, or other user to enter commands and information to computing device **700**, and also allow information to be presented to the customer, utility, or other user and/or other components or devices. Examples of input devices include, but are not limited to, a keyboard, a cursor control device (e.g., a mouse), a microphone, and a scanner. Examples of output devices include, but are not limited to, a display device (e.g., a monitor or projector), speakers, a printer, and a network card.

Various techniques are described herein in the general context of software or program modules. Generally, software includes routines, programs, objects, components, data structures, and so forth that perform particular tasks or implement particular abstract data types. An implementation of these modules and techniques are stored on or transmitted across some form of computer readable media. Computer readable media is any available non-transitory medium or non-transitory media that is accessible by a computing device. By way of example, and not limitation, computer readable media includes "computer storage media".

"Computer storage media" and "computer readable medium" include volatile and non-volatile, removable and non-removable media implemented in any method or technology for storage of information such as computer readable instructions, data structures, program modules, or other data. Computer storage media include, but are not limited to, computer recordable media such as RAM, ROM, EEPROM, flash memory or other memory technology, CD-ROM, digital versatile disks (DVD) or other optical storage, magnetic cassettes, magnetic tape, magnetic disk storage or other magnetic storage devices, or any other medium which is used to store the desired information and which is accessible by a computer.

The computer device **700** is connected to a network (not shown) (e.g., a local area network (LAN), a wide area network (WAN) such as the Internet, or any other similar type of network) via a network interface connection (not shown) according to some exemplary embodiments. Those skilled in the art will appreciate that many different types of computer systems exist (e.g., desktop computer, a laptop computer, a personal media device, a mobile device, such as a cell phone or personal digital assistant, or any other computing system

capable of executing computer readable instructions), and the aforementioned input and output means take other forms, now known or later developed, in other exemplary embodiments. Generally speaking, the computer system **700** includes at least the minimal processing, input, and/or output means necessary to practice one or more embodiments.

Further, those skilled in the art will appreciate that one or more elements of the aforementioned computer device **700** is located at a remote location and connected to the other elements over a network in certain exemplary embodiments. Further, one or more embodiments is implemented on a distributed system having one or more nodes, where each portion of the implementation (e.g., communication engine **306**, communication engine **406**) is located on a different node within the distributed system. In one or more embodiments, the node corresponds to a computer system. Alternatively, the node corresponds to a processor with associated physical memory in some exemplary embodiments. The node alternatively corresponds to a processor with shared memory and/or resources in some exemplary embodiments.

Using example embodiments of mass notification systems described herein allows a user, an audio device, and/or a client to access information, in real time, about one or more network devices within the mass notification system. This information can be used during steady state operation of one or more network devices and/or when the state of one or more network devices changes. Existing equipment (e.g., network, communication channels) needed to communicate with network devices can be used, so additional resources needed to use example embodiments are minimal.

Installation or alteration of a client and/or an audio device (and its corresponding functionality as described herein) may also be minimal. Specifically, a client and/or an audio device can be communicably coupled to any node in the communication network of the mass notification system, and an addition to existing operating parameters and/or change in software/logic rules can be installed. Communicably coupling a client and/or an audio device can be performed seamlessly, often using wireless or a minimal amount of wired technology. Example embodiments are more efficient and flexible than existing mass notification systems. Costs of installing, replacing, modifying, and/or maintaining a mass notification system using example embodiments is reduced. Thus, labor costs can also be reduced using example embodiments.

Although embodiments described herein are made with reference to example embodiments, it should be appreciated by those skilled in the art that various modifications are well within the scope and spirit of this disclosure. Those skilled in the art will appreciate that the example embodiments described herein are not limited to any specifically discussed application and that the embodiments described herein are illustrative and not restrictive. From the description of the example embodiments, equivalents of the elements shown therein will suggest themselves to those skilled in the art, and ways of constructing other embodiments using the present disclosure will suggest themselves to practitioners of the art. Therefore, the scope of the example embodiments is not limited herein.

What is claimed is:

1. A mass notification system, comprising:

a communication network;

a plurality of network devices comprising a first network device and a second network device, wherein the plurality of network devices are communicably coupled to the communication network, wherein the first network device is configured to generate a first notification, and wherein the second network device is configured to generate a second notification substantially simultaneously when the first notification is generated by the first network device;

a server communicably coupled to the communication network and configured to control the plurality of network devices, wherein the server instructs the first network device to generate the first notification and the second network device to generate the second notification; and

a first client communicably coupled to the communication network and comprising a user interface, wherein the first client is configured to communicate, via the user interface, with the server and the plurality of network devices,

wherein the first client is connected to a first node of the communication network at a first time, and wherein the first client is connected to a second node of the communication network at a second time.

2. The system of claim **1**, wherein the first client is further configured to control the plurality of network devices, wherein the first client overrides the server to control the plurality of network devices when the first client sends a first instruction to at least one of the plurality of network devices using the communication network.

3. The system of claim **1**, wherein the first client is a read-only device.

4. The system of claim **1**, wherein the first client uses a web browser.

5. The system of claim **1**, wherein the first client is configured to control the server.

6. The system of claim **1**, further comprising:

a second client communicably coupled to the communication network and configured to control the plurality of network devices,

wherein the second client overrides the server to control the plurality of network devices when the second command center sends a second instruction to at least one of the plurality of network devices using the communication network.

7. The system of claim **6**, wherein the first instruction and the second instruction are prioritized with respect to each other using at least one logic rule.

8. The system of claim **1**, wherein the first client is one of the plurality of network devices.

9. The system of claim **1**, wherein the plurality of network devices comprises an audio device, wherein the audio device is a source of audio for at least one other network device of the plurality of network devices.

10. The system of claim **9**, wherein the audio device is connected to a first node of the communication network at a first time, and wherein the audio device is connected to a second node of the communication network at a second time.

11. A mass notification system, comprising:

a communication network;

a plurality of network devices comprising a first network device and a second network device, wherein the plurality of network devices are communicably coupled to the communication network, wherein the first network device is configured to generate a first notification, and wherein the second network device is configured to generate a second notification substantially simultaneously when the first notification is generated by the first network device, wherein the first network device and the second network device comprise an audio device; and

a server communicably coupled to the communication network and configured to control the plurality of network devices,

wherein the audio device is a source of audio for a remainder of the plurality of network devices,

wherein the source of audio generated by the audio device and delivered to the remainder of the plurality of network devices overrides the server,

wherein the audio device is connected to a first node of the communication network at a first time, and wherein the audio device is connected to a second node of the communication network at a second time.

12. The system of claim **11**, wherein the remainder of the first network device and the second network device is selectable using the audio device.

13. The system of claim **11**, wherein the remainder of the first network device and the second network device is selectable using the server.

14. The system of claim **11**, wherein the audio device comprises:

a hardware processor; and

a communication engine executing instructions on the hardware processor and configured to:

control the remainder of the first network device and the second network device;

generate audio; and

send the audio to the remainder of the first network device and the second network device.

15. The system of claim **11**, wherein the audio device overrides the server based on an instruction from the server to the first network device and the second network device.

16. The system of claim **15**, wherein the instruction further instructs at least one network device, aside from the first network device and the second network device, to perform a task.

17. The system of claim **11**, wherein the audio device is communicably coupled to a client, wherein the client is communicably coupled to the communication network and is configured to communicate, via the user interface, with the server and the plurality of network devices.

18. A method for controlling a mass notification system, comprising:

receiving a communication from a client communicably coupled to the mass notification system, wherein the mass notification system is controlled by a server;

transferring, in response to the communication, control of the notification system to the client,

wherein the mass notification system comprises a plurality of network devices, wherein the plurality of network devices comprises a first network device and a second network device, wherein the first network device is configured to generate a first notification, and wherein the second network device is configured to generate a second notification substantially simultaneously when the first notification is generated by the first network device, wherein the first notification and the second notification are generated based on a subsequent communication from the client,

wherein the client is connected to a first node of the mass notification system at a first time, and wherein the client is connected to a second node of the mass notification system at a second time.

* * * * *